Photothermal Radiometry Study of Buried Structures in Biomineralized Materials

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Some species of marine mollusks develop inhomogeneities inside the shell, with the consequence that the shell is susceptible to wear induced by the water movement causing collisions with rocks, sand and other organisms.

These inhomogeneities make the shells fragile, having the consequence that organisms are more susceptible to environmentally aggressive agents; in particular they would be more easily attacked by predators.

These defects in the structures of the shells are due to non-uniform growth of successive layers, producing gaps that in some cases could be very large. In other cases, cylindrical structures containing keratin are also observed; these structures have been conjectured to be formed by a strategy of bio-mineralization for defense against parasites or worm predators that have been able to reach the soft part of the mollusk.

The case of the shells of the oysters is especially interesting because the structure is made mainly of calcite crystals, showing the shell, in some cases, defects that vary in size, form and origin.

In this work, the study of buried macroscopic defects in shells of the mollusk Crassostrea virginica is reported. The measurements were done using photothermal radiometry in backscattering mode. It is shown that it is possible to estimate the dimensions of the defect in the structure. Our results are complemented by destructive methods and compared with structures artificially made in the shell. The extension of our results for *in-vivo* and *in-situ* conditions is discussed.